

**AMENDMENTS TO THE CLAIMS**

1. (Previously Presented) A memory read circuit, comprising:
  - a plurality of memory cells, each being formed to store data as an energy-absorbing state;
  - a conductor line electrically coupled to each of said plurality of memory cells; and
  - a fast fourier transform analysis circuit electrically coupled to said conductor line, wherein said plurality of memory cells, said conductor line and said fast fourier transform analysis circuit are connected to simultaneously read data stored in each of said plurality of memory cells in response to a read signal applied to said conductor line.
2. (Currently Amended) The ~~read memory~~ memory read circuit of claim 1, wherein said memory cells are zero field splitting resonance memory cells.
3. (Currently Amended) The ~~read memory~~ memory read circuit of claim 1, wherein said memory cells are PCRAM cells.
4. (Currently Amended) The ~~read memory~~ memory read circuit of claim 1, wherein said memory cells are MRAM cells.
5. (Currently Amended) The ~~read memory~~ memory read circuit of claim 1, wherein said memory cells are polymer memory cells.
6. (Currently Amended) The ~~read memory~~ memory read circuit of claim 1, wherein said memory cells are chalcogenide memory cells.
7. (Currently Amended) The ~~read memory~~ memory read circuit of claim 1, wherein said memory cells are differential negative resistance memory cells.

8. (Currently Amended) The ~~read memory~~ memory read circuit of claim 1, wherein said memory cells comprise a host material incorporating metal ions, said host material and metal ions being configured to absorb a detectable amount of energy corresponding to a separation in energy of the electron spin levels of said metal ions at zero field.

9. (Currently Amended) The ~~read memory~~ memory read circuit of claim 8, wherein said host material and said metal ions are configured to absorb about  $0.03\text{ cm}^{-1}$  to about  $3.3\text{ cm}^{-1}$  when programmed to an energy absorbing state.

10. (Currently Amended) The ~~read memory~~ memory read circuit of claim 8, wherein said host material and said metal ions are configured to absorb about  $0.33\text{ cm}^{-1}$  at a frequency of about 9.68 GHz when a respective memory cell is programmed to said energy-absorbing state.

11. (Currently Amended) The ~~read memory~~ memory read circuit of claim 1, wherein the configuration of said plurality of memory cells, said conductor line and said fast fourier transform analysis circuit can provide a signature pulse out potential shape during a read operation, said signature pulse out potential shape representing the programmed state of each of said plurality of memory cells.

12. (Currently Amended) The ~~read memory~~ memory read circuit of claim 11, wherein said signature pulse out potential shape is defined by the programmed state of said plurality of memory cells and the location of each along said conductor line.

13. (Currently Amended) The ~~read memory~~ memory read circuit of claim 1, wherein said conductor line is a column line.

14. (Previously Presented) A memory read circuit, comprising:

a plurality of memory cells, each comprising a first electrode and a second electrode electrically coupled to a host material incorporating metal ions, said metal ions exhibiting zero field

splitting resonance, said host material and metal ions being formed to store data as an energy-absorbing state and a non-energy-absorbing state;

a conductor line electrically coupled to each of said plurality of memory cells; and

a fast fourier transform analysis circuit electrically coupled to said conductor line, wherein said plurality of memory cells, said conductor line and said fast fourier transform analysis circuit are connected to simultaneously read data stored in each of said plurality of memory cells in response to a read signal applied to said conductor line.

15. (Currently Amended) The ~~read memory~~ memory read circuit of claim 14, wherein said host material is germanium selenide.

16. (Currently Amended) The ~~read memory~~ memory read circuit of claim 14, wherein said metal ions comprise  $Mn^{+2}$ .

17. (Currently Amended) The ~~read memory~~ memory read circuit of claim 14, wherein said host material is  $Ge_{40}Se_{60}$  incorporating about 3 wt. %  $Mn^{+2}$  as said metal ions.

18. (Currently Amended) The ~~read memory~~ memory read circuit of claim 14, wherein said host material and said metal ions are configured to absorb a detectable amount of energy corresponding to a separation in energy of the electron spin levels of said metal ions at zero field.

19. (Currently Amended) The ~~read memory~~ memory read circuit of claim 14, wherein said host material and said metal ions are configured to absorb about  $0.03\text{ cm}^{-1}$  to about  $3.3\text{ cm}^{-1}$  when a respective memory cell is programmed to said energy-absorbing state.

20. (Currently Amended) The ~~read memory~~ memory read circuit of claim 14, wherein said plurality of memory cells are each configured to be programmed to said energy-absorbing state by a light pulse.

21. (Currently Amended) The ~~read memory~~ memory read circuit of claim 14, wherein said plurality of memory cells are each configured to be programmed to said energy-absorbing state by an electrical pulse.

22. (Currently Amended) The ~~read memory~~ memory read circuit of claim 14, wherein the configuration of said plurality of memory cells, said conductor line and said fast fourier transform analysis circuit can provide a signature pulse out potential shape during a read operation, said signature pulse out potential shape representing the programmed state of each of said plurality of memory cells.

23. (Currently Amended) The ~~read memory~~ memory read circuit of claim 22, wherein said signature pulse out potential shape is defined by the programmed state of said plurality of memory cells and the location of each along said conductor line.

24. (Currently Amended) The ~~read memory~~ memory read circuit of claim 14, wherein said conductor line is a column line.

25. (Previously Presented) A processor-based device, comprising:

a processor; and

a memory read circuit, comprising:

a plurality of memory cells, each comprising a first electrode and a second electrode electrically coupled to a host material incorporating metal ions, said metal ions exhibiting zero field splitting resonance, said host material and metal ions being formed to store data as an energy-absorbing state and a non-energy-absorbing state;

a conductor line electrically coupled to each of said plurality of memory cells; and

a fast fourier transform analysis circuit electrically coupled to said conductor line, wherein said plurality of memory cells, said conductor line and said fast fourier transform analysis

circuit are connected to simultaneously read data stored in each of said plurality of memory cells in response to a read signal applied to said conductor line.

26. (Currently Amended) The ~~read memory~~ processor-based device of claim 25, wherein said host material is  $Ge_{40}Se_{60}$  incorporating about 3 wt. %  $Mn^{+2}$  as said metal ions.

27. (Currently Amended) The ~~read memory~~ processor-based device of claim 25, wherein the configuration of said plurality of memory cells, said conductor line and said fast fourier transform analysis circuit can provide a signature pulse out potential shape during a read operation, said signature pulse out potential shape representing the programmed state of each of said plurality of memory cells.

28. (Currently Amended) The ~~read memory~~ processor-based device of claim 27, wherein said signature pulse out potential shape is defined by the programmed state of said plurality of memory cells and the location of each along said conductor line.

29. (Previously Presented) A method of simultaneously reading a plurality of memory cells, comprising:

providing a plurality of memory cells, each being programmable to an energy-absorbing state and electrically connected to a conductor line, said conductor line being in electrical communication with a fast fourier transform analysis circuit;

programming at least one of said plurality of memory cells to said energy-absorbing state; and

reading said plurality of memory cells simultaneously by sensing the absorption or transmission of a read energy pulse through each of said plurality of memory cells.

31. (Previously Presented) The method of claim 29, wherein said memory cells are zero field splitting resonance memory cells.

32. (Previously Presented) The method of claim 29, wherein said memory cells are PCRAM cells.

33. (Previously Presented) The method of claim 29, wherein said memory cells are MRAM cells.

34. (Previously Presented) The method of claim 29, wherein said memory cells are polymer memory cells.

35. (Previously Presented) The method of claim 29, wherein said memory cells are chalcogenide memory cells.

36. (Previously Presented) The method of claim 29, wherein said memory cells are differential negative resistance memory cells.

37. (Previously Presented) The method of claim 29, wherein said reading said plurality of memory cells comprises applying energy to each of said plurality of memory cells without changing the programming of any said memory cell.

38. (Previously Presented) The method of claim 29, wherein a fast fourier transform analysis circuit is configured to interpret the read energy pulse through said plurality of memory cells as an output signature defined by the programmed state and location on a conductor line of each cell of said plurality of memory cells.

39. (Previously Presented) A method of simultaneously reading a plurality of memory cells, comprising:

providing a plurality of memory cells, each comprising a host material which incorporates metal ions exhibiting zero field splitting resonance;

interconnecting said plurality of memory cells with a conductor line in electrical communication with a fast fourier transform analysis circuit;

programming at least one cell of said plurality of memory cells to an energy-absorbing state corresponding to a separation of spin states of said metal ions at zero magnetic field; and

reading said plurality of memory cells simultaneously by sensing the absorption or transmission of a read energy pulse through said host material of said plurality of memory cells.

40. (Previously Presented) The method of claim 39, wherein said host material comprises  $\text{Ge}_{40}\text{Se}_{60}$  glass.

41. (Previously Presented) The method of claim 39, wherein said metal ions comprise  $\text{Mn}^{+2}$ .

42. (Previously Presented) The method of claim 39, wherein said reading said plurality of memory cells comprises applying energy to said host material of each memory cell of said plurality of memory cells in the microwave frequency range.

43. (Previously Presented) The method of claim 39, wherein said reading said plurality of memory cells comprises applying an energy pulse to said host material of at least about  $0.03 \text{ cm}^{-1}$  at a frequency of about 9.68 GHz with a risetime of about 200 picoseconds.

44. (Previously Presented) The method of claim 39, wherein said fast fourier transform analysis circuit is configured to interpret the read energy pulse through said plurality of memory cells as an output signature defined by the programmed state and location on said conductor line of each memory cell of said plurality of memory cells.

45. (Previously Presented) A method of simultaneously reading a plurality of memory cells, comprising:

providing a plurality of memory cells, each comprising  $\text{Ge}_{40}\text{Se}_{60}$  glass incorporating  $\text{Mn}^{+2}$  ions, each said memory cells being configured to exhibit zero field splitting resonance;

interconnecting said plurality of memory cells with a conductor line in electrical communication with a fast fourier transform analysis circuit;

programming at least one of said plurality of memory cells to an energy-absorbing state corresponding to a separation of spin states of said metal ions at zero magnetic field; and

reading said plurality of memory cells simultaneously, said reading comprising:

applying energy in the microwave frequency range to said host material of each memory cell of said plurality of memory cells without changing the programming of any said memory cell,

interpreting the absorption or transmission of said energy through said host material of said plurality of memory devices, and

utilizing said fast fourier transform analysis circuit to produce an output signature defined by the programmed state and location on said conductor line of each of said plurality of memory devices.